

*ARMADILLOGORGIA CYATHELLA* AND  
*OPHIDIOGORGIA PARADOXA*, TWO NEW  
GENERA AND SPECIES OF PRIMNOID OCTOCORALS  
(COELENTERATA: ANTHOZOA) FROM SOUTH  
GEORGIA AND SOUTH ORKNEY ISLANDS

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*Abstract.*—*Armadillogorgia cyathella* and *Ophidiogorgia paradoxa*, two new genera and species of flagelliform primnoids with verticillate polyps, are described from South Georgia and South Orkney Islands. They are illustrated by scanning electron micrographs, photographs, and drawings, and are compared with species in the related genus *Primnoella*.

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Investigations on the large number of octocoral specimens from several parts of the world added in recent years to the collections of the National Museum of Natural History, Smithsonian Institution, continue to reveal new taxa the importance of which merits publication in advance of comprehensive studies now in progress. Two of these are new genera and species of Primnoidae from the extreme South Atlantic and Weddell Sea allied to *Primnoella*, which demonstrate the morphological diversity in a family remarkable for the consistency of its taxonomic characters. They diverge in opposite directions from *Primnoella* species such as *P. magalhaenica* Studer, which approach most closely the generalized primnoid condition with 8 complete longitudinal rows of body scales, of which the top-most sclerite in each row is specialized as an opercular scale and more or less overreached by the next following scale in the row. Neither can be accommodated within the genus *Primnoella* as now understood.

One of the genera now described demonstrates the extreme development of structural specializations characteristic of the "Compressae" group of *Primnoella* species, in which the two abaxial rows of body scales alone cover the exposed side of the appressed polyps, and the lateral and adaxial rows are reduced in size and number of scales as in *P. australasiae* Gray as described and illustrated by Versluys (1906:52, fig. 55). The other genus, with its body scales in a layer several sclerites in thickness and not aligned in orderly longitudinal rows, appears to be an extreme modification of the "Convexae" group, the species of which have the exposed side of the polyps covered by 4 visible rows of scales (2 abaxial, 2 outer lateral) as in *P. antarctica* as described and illustrated by Kükenthal (1919:391, figs. 166-170). In the present case, new sclerites added between those of the original

8 rows disrupt the orderly arrangement. Moreover, in this genus, the polyps have a strong tendency to partial fusion into groups of two or three, a feature developed to the fullest in the genera *Callozostron* Wright and *Ainigmaptilon* Dean.

*Armadilloorgia*, gen. nov.

*Diagnosis*.—Dichotomously branched primnoids, axis stiff, brittle, calcified, without chambered core, holdfast spreading on solid substrate; polyps in whorls, closely appressed and adnate to stem, with 2 abaxial rows of numerous, closely fitting, narrow sclerites shaped like sickle blades set with the convex side outward and meeting at a zigzag suture line along the smoothly rounded middle of the abaxial side, forming a glossy, tight-fitting armor; lateral sclerites not in regular rows, not like the abaxials and not scalelike but similar to those of coenenchyme; no differentiated operculum, calicular aperture surrounded by small, imbricated, serrate scales. Coenenchyme thick, in 2 layers separated by solenia, inner layer filled with tuberculate, spheroidal or irregular grains, outer with tuberculate spheroids having a smooth, goblet-shaped or foliate process directed outward.

*Type-species*.—*Armadilloorgia cyathella*, sp. nov., here designated.

*Distribution*.—South Georgia.

*Etymology*.—The name alludes to the transverse abaxial sclerites of the polyps, which call to mind the band-like armor of the mammals called “armadillo”; Spanish, from Latin *armatus*, armed. Gender feminine.

*Comparisons*.—This genus is grossly similar to *Primnoella* but the verticillate polyps are adnate to the stem except for the oral region, the scales surrounding the aperture are numerous and not modified as an 8-parted operculum, and the abaxial body sclerites are so extremely modified that they have lost the scalelike form retained in even the most strongly modified species of *Primnoella*.

*Armadilloorgia cyathella*, sp. nov.

Figs. 1–5

*Material*.—Off South Georgia: 54°29'S, 39°22'W to 54°31'S, 39°19'W; 659–686 m. *Eltanin* cruise 22, sta. 1536, 8 February 1966. One colony.

*Description*.—The colony (Fig. 1) is sparsely branched in a dichotomous fashion, arising from a spreading holdfast devoid of polyps, attached to a dead scleractinian skeleton. The main trunk is stout, 9 mm in diameter exclusive of polyps, 16 mm in diameter including the whorls of tightly appressed polyps; whorls of polyps beginning immediately above the holdfast, the polyps of the first whorl rudimentary or vestigial, those of the next whorl well-developed. The first bifurcation of the axis occurs 7.5 cm above the holdfast, where the axis is broken and one branch lost. The other branch,



Fig. 1. *Armadilloorgia cyathella*. Holotype, USNM 58166.

detached from the main stem, is 8 cm long to the next bifurcation, where both branches were broken off and lost. Therefore, the height of the intact colony cannot be estimated, but the stoutness of the supporting axis and large size of the whorls would indicate a colony of substantial size, possibly a meter or more in height, with repeated bifurcations.

The whorls are composed of 15–20 polyps 4–7 mm tall, almost or quite touching the polyps of the next whorl above. Some of the whorls are obliquely set, and a few adjacent whorls join as a tight spiral. Seven whorls occur in 4 cm of axial length.

The abaxial surface of the polyps is covered by two rows of 40–55 tightly fitting sclerites meeting along a zigzag suture line, curved to fit the contour

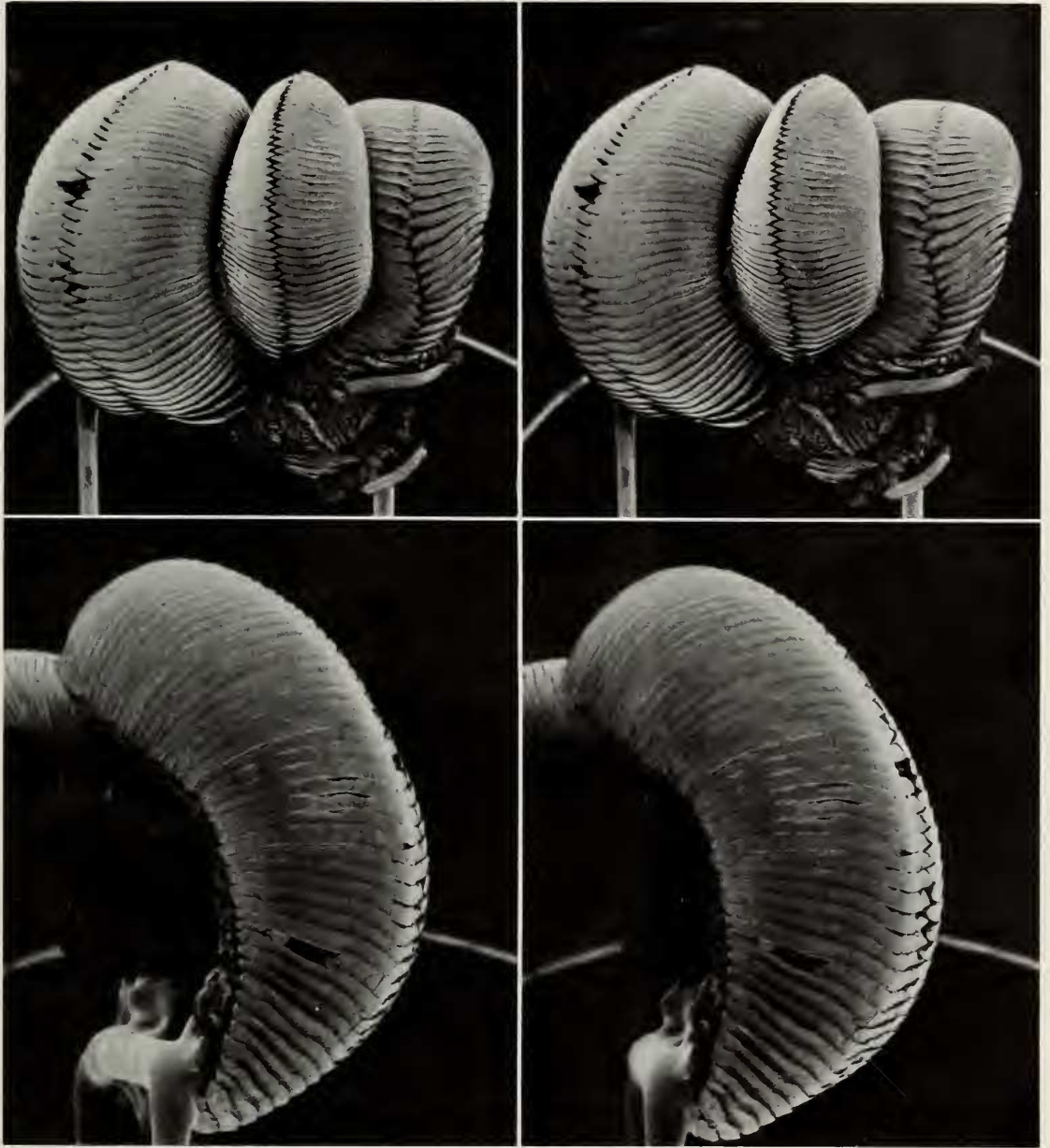


Fig. 2. *Armadillologorgia cyathella*. Holotype, USNM 58166: **Top**, three polyps in abaxial aspect, SEM, stereo pair, approximately  $\times 8$ . **Bottom**, side view of left-hand polyp above, SEM, stereo pair, approximately  $\times 13$ .

of the body wall (Fig. 2). The external face of the abaxial sclerites (Fig. 4a) is smooth and faintly concave, the two sides facing the adjacent sclerites above and below also slightly concave and smooth but sculptured near the adaxial end with a few inconspicuous radial wrinkles; a ridge of very complicated tubercles extends along the inner angle of the sclerite, serving to anchor it in the mesogloea of the abaxial body wall. Each side of the polyps has a longitudinal tract of closely packed sclerites consisting of a

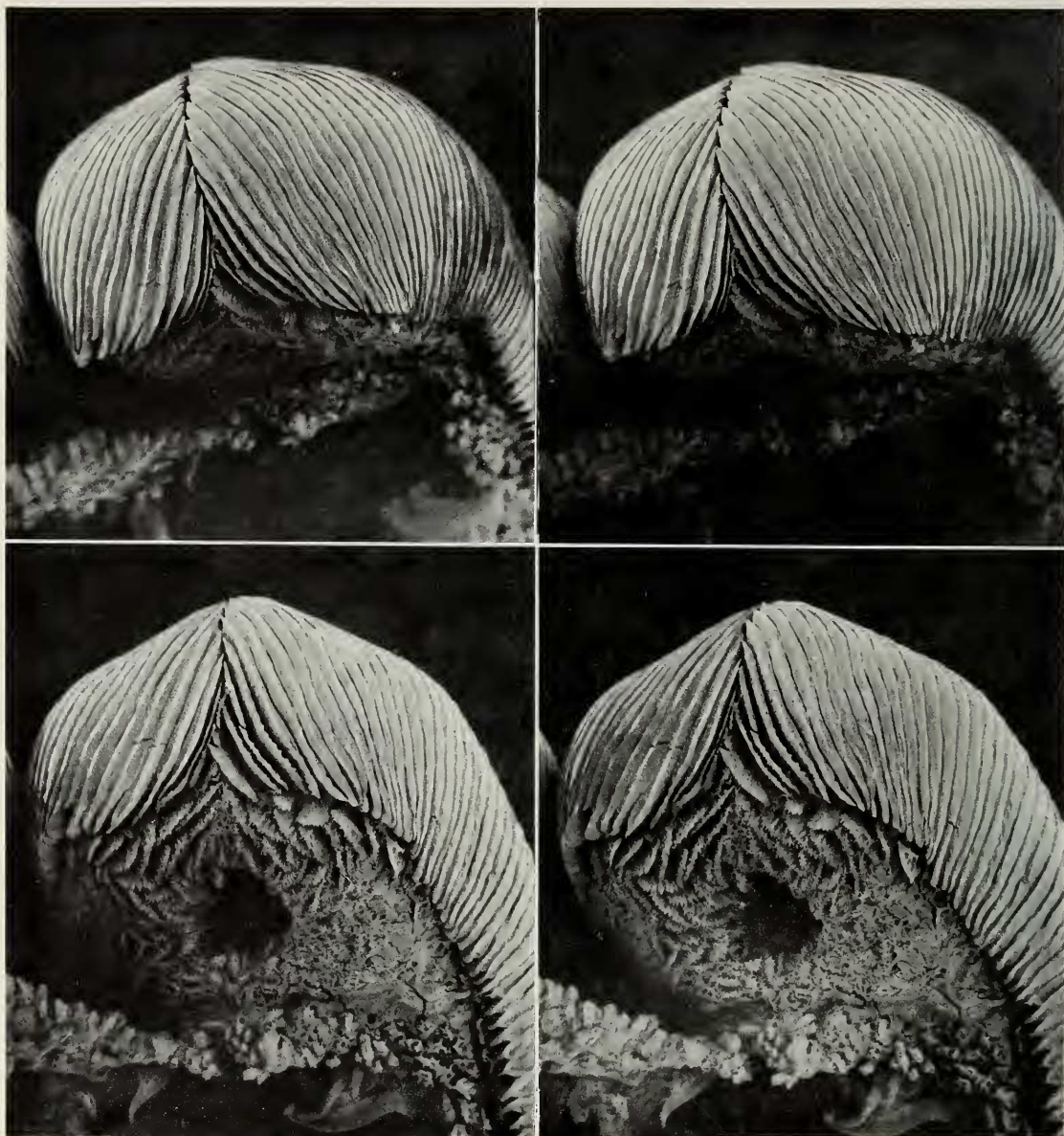
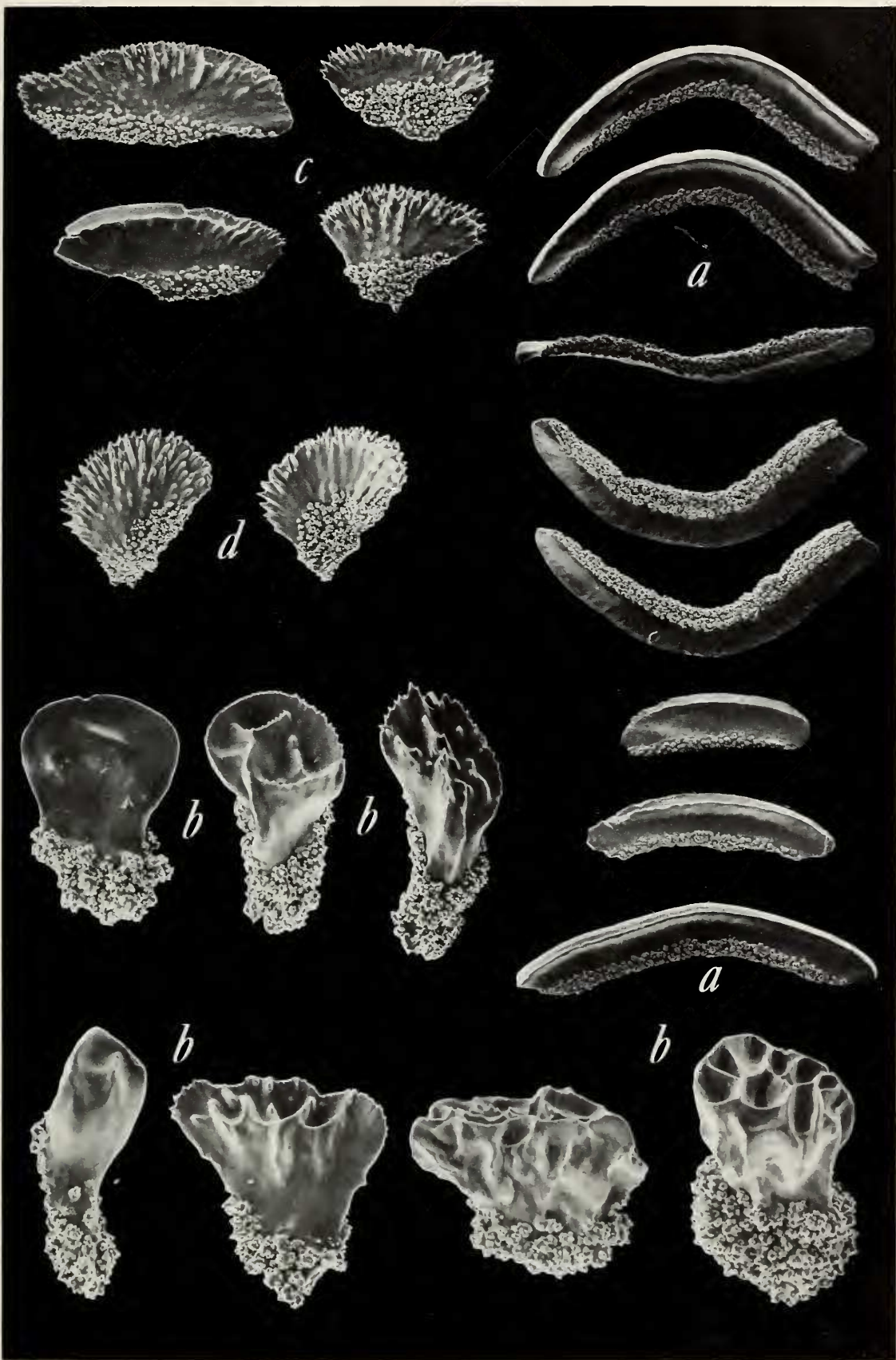


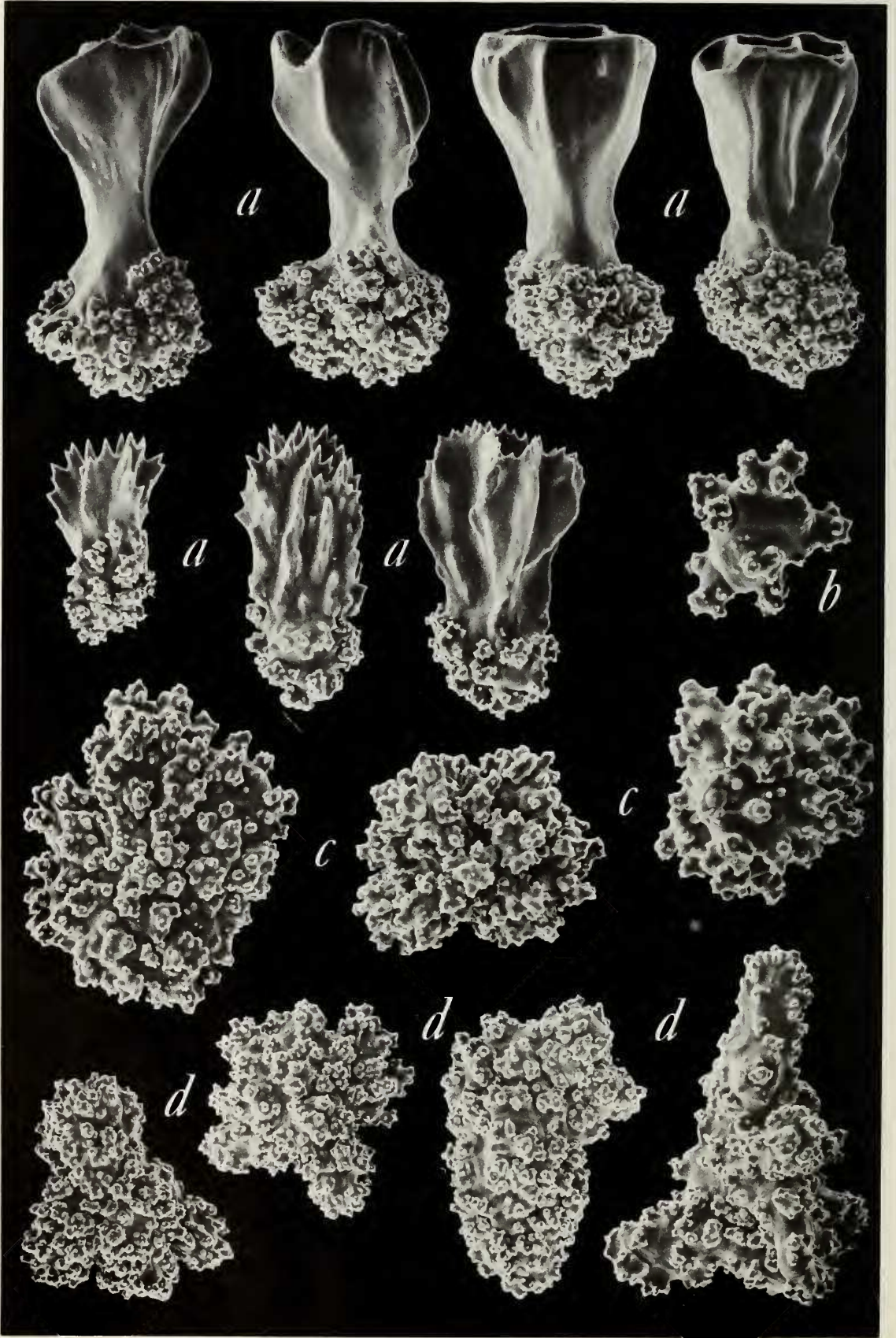
Fig. 3. *Armadilloorgia cyathella*. Holotype, USNM 58166: **Top**, apical view of left-hand polyp in Fig. 2, SEM, stereo pair, approximately  $\times 21$ . **Bottom**, oral view of same, SEM, stereo pair, approximately  $\times 23$ .

tuberculated base and a more or less expanded projecting leaf, representing the outer-lateral and inner-lateral scale rows and joining the adnate polyps to the adjacent coenenchyme (Fig. 4b). The distalmost body scales are not differentiated to form an operculum, those of the abaxial rows decreasing

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Fig. 4. *Armadilloorgia cyathella*. Holotype, USNM 58166: **a**, Abaxial sclerites,  $\times 18$ ; **b**, Coenenchymal sclerites from lateral margins of polyps,  $\times 100$ ; **c**, Circumoral and smaller abaxial sclerites,  $\times 37.5$ ; **d**, Circumoral sclerites, interior and exterior views,  $\times 50$ .





in size and converging toward the inturned oral aperture (Fig. 3). The foliate processes of the distalmost lateral and adaxial sclerites overlap one another and are directed toward the oral aperture (Fig. 3, 4c, d). As the polyps are adnate to the coenenchyme except for the area immediately surrounding the calicular aperture, there is no adaxial wall.

The coenenchyme is thick, separated into two layers by a system of solenia. The outer layer is filled with sclerites having a spheroidal, tuberculated base and a projecting leaflike, lacinated or cupshaped outer process (Fig. 5a), together forming a dense pavement between the polyps. The inner layer of coenenchyme is filled with coarsely tuberculated grains (Fig. 5c, d) showing evidence of derivation from 6- and 8-radiate forms (Fig. 5b).

*Holotype*.—USNM 58166.

*Etymology*.—Latin *cyathus*, from Greek *kyathos*, a cup, + diminutive suffix, in allusion to the often cuplike coenenchymal sclerites. A noun in apposition.

*Comparisons*.—As illustrated by Thomson & Ritchie (1906:pl. 2, fig. 8), *Primnoella scotiae* from Burdwood Bank very closely resembles *Armadilloorgia cyathella*, but their description (1906:854) clearly indicates that the abaxial sclerites are broad scales of essentially primnoid form having the inner surface tuberculated and the outer surface tuberculated where covered by the adjacent scale but smooth (except for very fine wavy lines) where exposed. The abaxial rows are composed of 21–28 scales compared with more than 40 in *A. cyathella*. The calices, up to 3 mm long and 1 mm wide, are appressed but not adnate, as they are described as having adaxially “two small longitudinal rows along the edges, but the rest of the surface is covered with indistinct roundish scales irregularly disposed.” The whorls are composed of fewer polyps (9–11) and are smaller in diameter (4 mm) than in *A. cyathella*. It is highly probable that *Primnoella compressa* Kükenthal, 1919, is a synonym of *P. scotiae*, and *P. philippii* Aurivillius, 1931, is very closely related. These, together with *P. biserialis* Wright and Studer and *P. delicatissima* Kükenthal form a distinctive “*biserialis* group” of species approaching, but much less modified than, *Armadilloorgia*.

### *Ophidiorgia* gen. nov.

*Diagnosis*.—Unbranched primnoids with polyps in regular whorls. Polyps tall, cylindrical, directed upward and appressed to coenenchyme but not

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Fig. 5. *Armadilloorgia cyathella*. Holotype, USNM 58166: a, Outer coenenchymal sclerites,  $\times 168$ ; b, Small inner coenenchymal sclerite,  $\times 224$ ; c, Larger inner coenenchymal sclerites,  $\times 163$ ; d, Largest inner coenenchymal sclerites,  $\times 112$ .



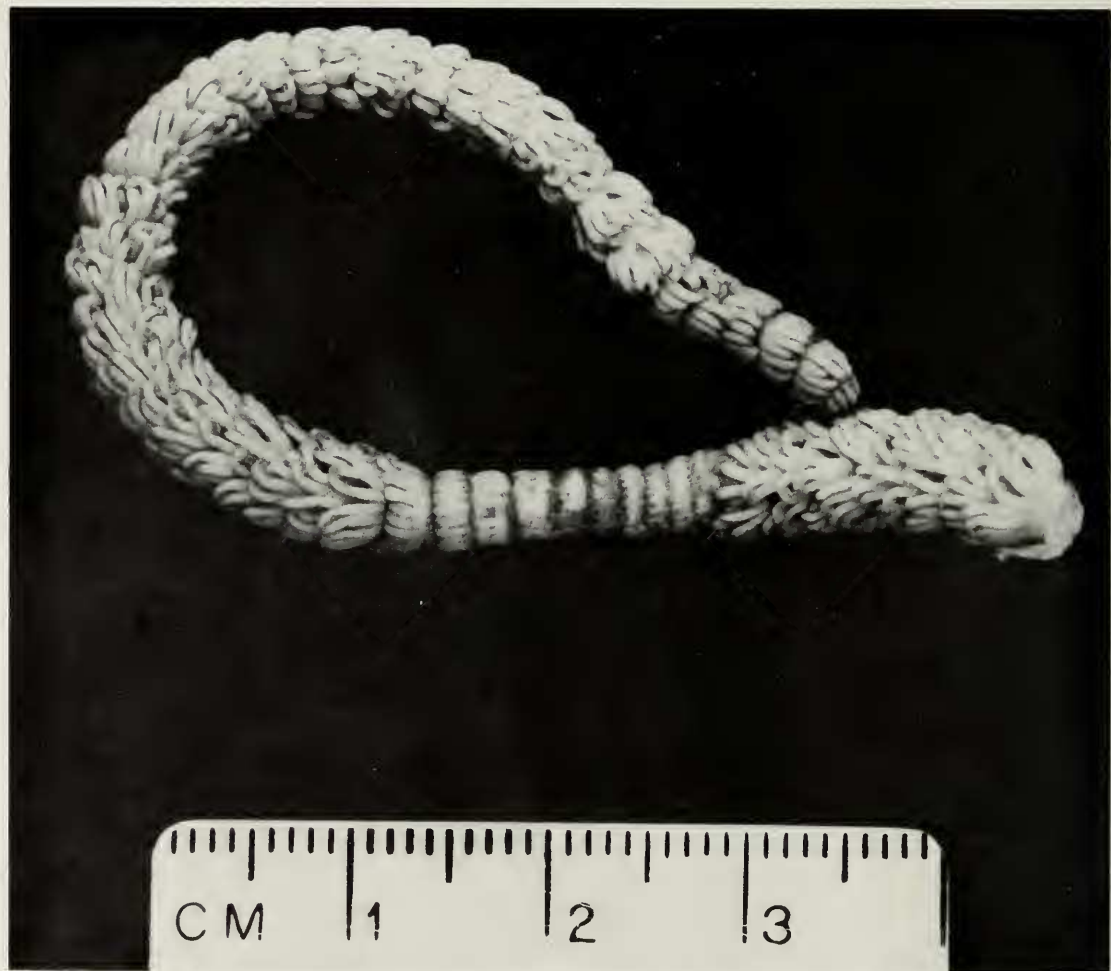


Fig. 6. *Ophidiogorgia paradoxa*. Holotype, USNM 58165.

adnate, covered abaxially and laterally with a multiple layer of circular platelets showing no trace of alignment in rows; adaxial side completely naked except for scales immediately surrounding the calicular aperture; scales folding inward around aperture but not differentiated as an operculum; tentacles without sclerites. Coenenchyme thick, outer layer filled with sclerites like those of polyps, inner layer containing stem canals separated by longitudinal tracts of tuberculate spheroids, mesogloea between inner and outer layers permeated by small solenia but lacking sclerites.

*Type-species*.—*Ophidiogorgia paradoxa*, sp. nov., here designated.

*Distribution*.—South Orkney Islands.

*Etymology*.—Greek *ophidion*, diminutive of *ophis*, serpent, + *gorgia*, in reference to the elongated, sinuous polyps. Gender feminine.

*Remarks*.—This genus is exceptional in several ways: (1) the absence of any indication of alignment of body sclerites in longitudinal rows in the fully developed polyps; (2) the tuberculate, pebble-like circular platelets scarcely

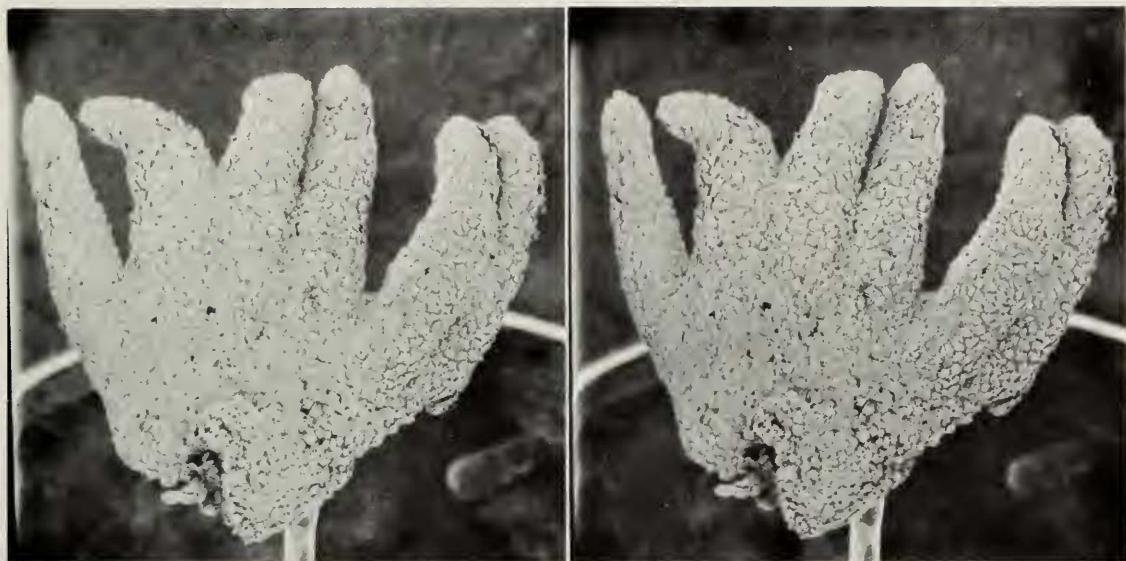


Fig. 7. *Ophidiogorgia paradoxa*. Holotype, USNM 58165: Six partially fused polyps in abaxial aspect, SEM, stereo pair, approximately  $\times 14$ .

differentiated as scales and deployed in a multiple layer; and (3) lack of specialization of the distalmost scales as an operculum. It grossly resembles the genus *Primnoella* and probably is most closely related to it. The irregular arrangement of the sclerites in the fully developed polyps can be interpreted as a derived character, as is the case in *Primnoeides*, because the scales of the young polyps in intercalary whorls retain traces of orderly rows (Fig. 8), which quickly become disrupted by addition of new sclerites as growth proceeds. As the polyps of *Ophidiogorgia* are adaxially naked, the genus must have arisen from a *Primnoella*-like precursor that already had lost its adaxial sclerites.

*Ophidiogorgia paradoxa*, sp. nov.

Figs. 6–9

*Material*.—South Orkney Islands: 60°31'S, 45°53.7'W, 30 fathoms (55 m). *Eastwind* sta. 66-020, 8 February 1966; D. L. Pawson and D. F. Squires, coll. One colony lacking holdfast and axis.

*Description*.—The colony (Fig. 6) is whiplike, 115 mm long and 5 mm in diameter proximally, lacking holdfast and axis, which evidently were lost during collection. The polyps are cylindrical, narrow, about 3 mm tall and approximately 0.5 mm in diameter, set in whorls of 16–21 on low annular thickenings of coenenchyme and proximally fused together (Fig. 7) in groups of 2 or 3, rarely more, directed upward and appressed to the coenenchyme but not adnate to it; the tentacles are preserved more or less exert and in most cases the oral region of the polyp is turned inward toward the coe-



Fig. 8. *Ophidiogorgia paradoxa*. Holotype, USNM 58165: Lateral views of distal part of two fully developed polyps with tentacles preserved exsert, and abaxial view of immature polyp.

enchyme (Fig. 8). About 5 whorls occur in 1 cm of axial length. Except for a narrow adaxial strip, the body of the fully developed polyps is filled with thick, roughly circular platelets having smooth, rounded, simple projections on the outer surface and compound tubercles on the inner surface (Fig. 9a), imbricating distad but not aligned in longitudinal rows and not confined to a layer one sclerite in thickness. The distal edge of the platelets, especially the larger ones, often has several pointed dentations, which may even project marginally as spines. The largest sclerites commonly develop an irregular, lumpy outer excrescence that gives them a pebble-like aspect. The distalmost sclerites are smaller but not different in shape from those of the proximal part of the body and are not differentiated as an operculum.

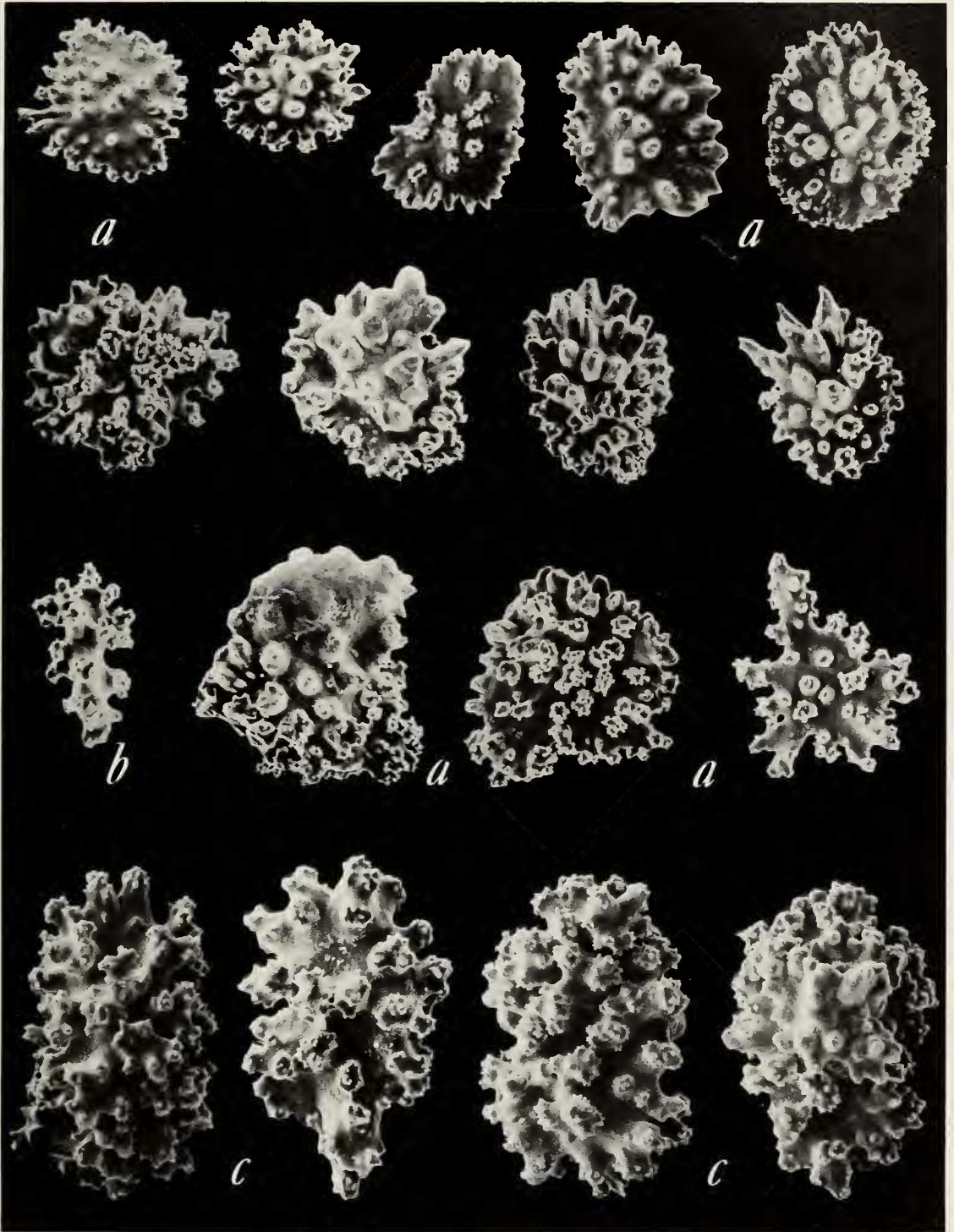


Fig. 9. *Ophidiogorgia paradoxa*. Holotype, USNM 58165: a, Sclerites of abaxial polyp walls,  $\times 175$ ; b, Inner coenenchymal sclerite,  $\times 175$ ; c, Inner coenenchymal sclerites,  $\times 250$ .

The coenenchyme is thick, divided into two layers separated by mesogloea permeated by solenia. The outer layer contains sclerites like those of the polyps but often with a more irregular outer surface. The inner layer, containing the longitudinal stem canals, is filled with irregular bodies covered with compound tubercles (Fig. 9b, c).

In the proximal one-third of the colony, all of the polyps in nine whorls are atrophied and partly eroded away in a zone 15 mm long. This is probably the site of attachment of some epizoic organism such as a comatulid crinoid, many species of which commonly cling to gorgonaceans semipermanently, causing similar damage. If the causative organism was indeed collected along with the gorgonian, it was disassociated from its host during preservation, sorting and processing.

*Holotype*.—USNM 58165.

*Etymology*.—Latin, *paradoxus*, strange.

*Comparison*.—This species superficially resembles unbranched *Primnoella* colonies but differs from all described species by the irregular arrangement of its body scales. The form of the sclerites is also unlike that of *Primnoella* species, which is distinctly scalelike and externally smooth or nearly so.

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